The exposed face of the rubberized asphalt shall have a removeable covering which shall remain on the membrane until it is ready to be placed.

A. **Primer.** The primer to be used with black polyethylene membrane shall be a type recommended by the membrane manufacturer.

B. **Joint Sealing Mastic.** The joint sealing mastic shall be a type recommended by the membrane manufacturer.

SECTION 826
JOINT MATERIALS

826.01 GENERAL

The crack sealant compound shall be packaged in sealed containers. Each container shall be clearly marked with the name of the manufacturer, the trade name of the sealant, the type of sealant, the weight, the manufacturer's batch and lot number, the pouring temperature, and the safe heating temperature.

The Contractor shall submit a sample of the sealant to the Materials and Research Division 3 weeks prior to being used on the Project. The sample shall be clearly marked with the Contractor's name and the Project number. Prior approval of any specific sealant material shall be required from the Materials and Research Division before it can be used on the Project.

A copy of the manufacturer's recommendations pertaining to the heating and application of the joint sealant material shall be submitted to the Engineer before the commencement of work. These recommendations shall be adhered to and followed by the Contractor. The temperature of the sealer in the field application equipment shall not exceed the safe heating temperature recommended by the manufacturer. Any given quantity of material shall not be heated at the pouring temperature for more than six hours and shall never be reheated. Material shall not be place if the temperature is below the manufacturer's recommended minimum application temperature.

Mixing of different manufacturer's brands or different types of sealant shall be prohibited.

Sealant materials may be placed during a period of rising temperature after the air temperature in the shade and away from artificial heat has reached 40°F. and indications are for a continued rise in temperature. During a period of falling temperature, the placement of sealant material shall be suspended when the air temperature, in the shade and away from artificial heat, reaches 40°F. Sealants shall not be placed when the weather or roadbed conditions are unfavorable.

826.02 MATERIALS

A. **Hot Applied Joint Sealant.**

1. **Type 1** . . . . . Crumb-Rubber Joint Sealant

The joint sealant material shall be a single component, hot-poured sealant meeting the requirements of AASHTO M-173 and shall have a minimum softening point of 190°F. (88°C.), as determined by ASTM D 36. The sealant shall resist softening and pickup by vehicle tires in the summer and cracking in the winter when used in this application. Plasticizers and fillers may be added as necessary to meet the requirements specified.

The sealant shall consist of a blend of asphalt cement and vulcanized granulated crumb tire rubber. The asphalt cement shall meet the requirements of AASHTO M-20 or M-226. The minimum percentage of crumb tire rubber added shall be 12% of the total weight of the sealant-rubber mixture.

The granulated crumb tire rubber shall be free of fabric, wire, cord, and other foreign material. Calcium carbonate may be added at a rate not to exceed 4% of the total weight of the crumb rubber to prevent the rubber particles from sticking together. The granulated crumb rubber shall meet the following requirements:

a. **Gradation.**

Sieve Size	Percent Passing
#8	100
#10	95 – 100
#30	0 – 20
#50	0 – 5

b. Specific Gravity of 1.15 ± 0.02

Acceptance. Joint Sealants that meet the quality requirements specified will be accepted at the contract unit price. Sealants that fail to meet the requirements specified but the quality deviation is not serious enough to materially affect the work quality will be paid for as follow:

Price Reduction Criteria. Reduce payment for the crumb rubber joint sealer by 20% if the Bond or Flow fails.

The payment for Penetration is reduced by the following schedule. Use the average of the original and check sample to determine the percentage of variation.

Variation of Penetration	Deduct Factor
0.1–5%	5%
5.1–10%	10%
10.1–15%	15%
> 15%	20%

The payment for Softening Point is reduced by the following schedule. Use the average of the original and check sample to determine the temperature variation.

Temperature Variation (Degrees C)	Deduct Factor
85–87.9	5%
80–84.9	10%
< 80	20%

2. **Type 2** . . . . . AASHTO M301 (ASTM D-3405) with the following modifications:

Penetration at 77°F. . . . . 120 – 150
Bond at –20°F., 3 cycles,
200% extension . . . . . Pass
The Sealant shall weigh not less than 9.0 nor more than 9.35 lbs./gallon.

Acceptance. Joint Sealants that meet the quality requirements specified will be accepted at the contract unit price. Sealants that fail to meet the requirements specified but the quality deviation is not serious enough to materially affect the work quality will be paid for as follow:

Price Reduction Criteria. Reduce payment for the crack sealer by 20% if the Bond or Flow fails.

The payment for Penetration is reduced by the following schedule. Use the average of the original and check sample to determine the percentage of variation.

Variation of Penetration	Deduct Factor
0.1–5%	5%
5.1–10%	10%
10.1–15%	15%
> 15%	20%

B. **Cold Applied Joint Sealant.**

1. **Type 5** . . . . . Low Modulus Silicone Sealant. The Low Modulus Silicone Sealant shall be furnished in a one-part silicone formulation. The silicone sealant material shall have a movement capability of +100% and –50% of joint width. This material shall meet the following requirements:

Test	Limit	Method
Flow	0.3 inch maximum	ASTM C-639
Extrusion Rate	75–250 grams/min.	ASTM C-603
Tack-Free Time	20–75 minutes	ASTM C-679
Specific Gravity	1.010–1.515	ASTM D-792, Method A

Durometer Hardness Type A: (Cured 7 days at 77°F. ± 3° and 45% to 50% R.H.)	10–25 (0°F.)	ASTM D-2240
Tensile Stress (at 150% elongation, 7-day cure at 77°F. ± 3° and 45% to 50% R.H.)	45 psi maximum	ASTM D-412 (Die C)
Elongation: (7-day cure at 77°F. ± 3° and 45% to 55% R.H.)	1000% minimum	ASTM D-412 (Die C)
Movement capability and adhesion (7-day cure in air, 77°F. ± 3° then 7 days in water, 77°F. ± 3°)	No adhesive or cohesive failure after 10 cycles (0°F.)	ASTM C-719*
Bonded to concrete mortar concrete briquets (air cured 7 days at 77°F. ± 3°)	50 psi minimum	AASHTO T-132**

*A 1-inch by 2-inch by 3-inch concrete block shall be prepared according to ASTM C-719. A sawed face shall be used for the bond surface. Two inches of block shall be sealed leaving 1/2 inch on each end of the specimen unsealed. The depth of the sealant shall be 3/8 inch and the width 1/2 inch. The sealant shall be subject to a movement according to ASTM C-719 at the rate of 1/8 inch per hour. One cycle is defined as an extension to one inch and returning to the initial 1/2 inch width.

**Briquets, molded according to AASHTO T-132, shall be sawed in half and bonded with approximately 10 mils of sealant and tested using clips meeting AASHTO T-132. The briquets shall be dried to a constant weight in an oven at 100°C. ± 5°. They shall be tested in tension at a loading rate of .3 inch/minute.

Backer rod shall be a “Type 1” rod material intended for use with cold-applied sealants in accordance with ASTM D 5249 – 95. The width of the backer rod shall be as recommended by the manufacturer for the required saw cut width. No bond or reaction shall occur between the rod and the sealant.

C. **Preformed Expansion Joint Fillers for Structural Construction.** . . . . . AASHTO M-213

D. **Preformed Expansion Joint Filler for Concrete (Bituminous Type).** . . . . . AASHTO M-33

E. **Rubber Gaskets.** . . . . . AASHTO M-198

F. **Flexible Gaskets.** . . . . . AASHTO M-198

G. **Preformed Elastomeric Compression Joint Seal for Concrete.** . . . . . AASHTO M-220